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ABSTRACT

The purpose of this document is to assist district and state level people in developing new science and/or mathematics curriculum frameworks and/or revising existing frameworks. This analysis tool is intended to stimulate discussion among state and local groups about potential components of a curriculum framework and to assist in the process of consensus-building, an essential requirement of developing ownership in a program. The following sections are included: (1) Laboratory Network Program Curriculum Frameworks Task Force; (2) Analysis Tool; and (3) Regional Educational Laboratory State Contacts in Mathematics and Science. (ZWH)

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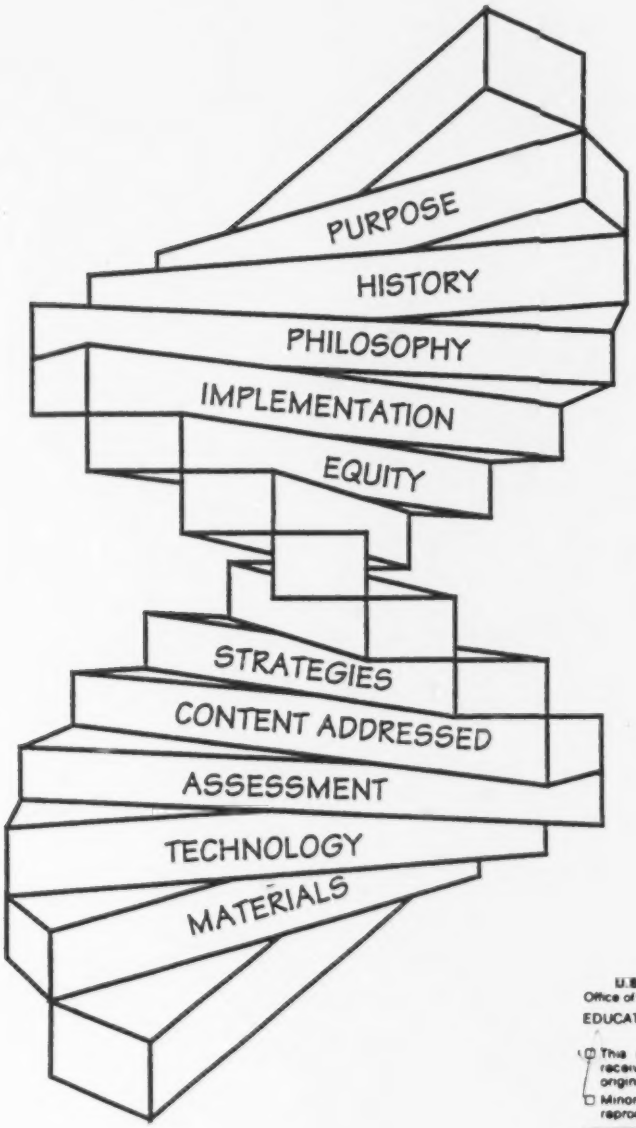

STATE

CURRICULUM

FRAMEWORKS

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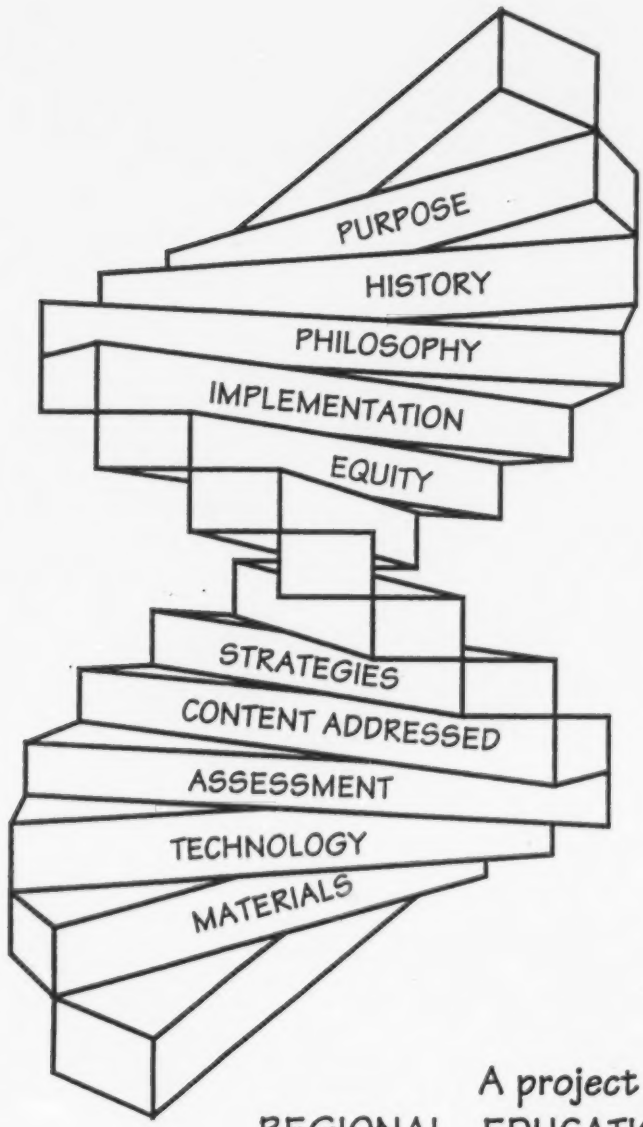

CURRICULUM FRAMEWORK ANALYSIS TOOL

by

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A project of the
REGIONAL EDUCATIONAL LABORATORY
NETWORK PROGRAM

REGIONAL EDUCATIONAL LABORATORY NETWORK PROGRAM

Appalachia Educational Laboratory

Far West Laboratory for Educational Research and Development

Mid-continent Regional Educational Laboratory

The Regional Laboratory for Educational Improvement of the Northeast and Islands

North Central Regional Educational Laboratory

Northwest Regional Educational Laboratory

Pacific Region Educational Laboratory

Research for Better Schools

SouthEastern Regional Vision for Education

Southwest Educational Development Laboratory

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Purpose

The purpose of this document is to assist district and state level people in developing new science and/or mathematics curriculum frameworks and/or revising existing frameworks. The analysis tool is intended to stimulate discussion among state and local groups about potential components of a curriculum framework and to assist in the process of consensus-building essential to developing ownership in a program/practice. While it is not intended to dictate practice, it does offer aspects of a curriculum framework that are both supported by current research and found in frameworks considered exemplary in the field.

History

In April of 1992, a Laboratory Network Program (LNP) was formed in an effort to enhance collaboration among the ten Regional Educational Laboratories (RELs) funded by the Office of Educational Research and Improvement (OERI). Among the LNP's tasks was a survey and analysis of state level curriculum frameworks in science and mathematics. A Curriculum Framework Task Force composed of representatives from each of the laboratories was formed, headed by a four-member design team composed of representatives from three of the regional educational laboratories: McREL, NWREL, and SEDL.

In June of 1992, the RELs were encouraged to gather samples of state level documents in science and mathematics from their respective regions. The design team then met to consider common elements in the documents and to come to consensus on desirable elements often missing from the documents. A synthesis of information contained in these documents resulted in the first draft of an analysis tool for analyzing science and mathematics curriculum frameworks. This draft was sent to all of the RELs for review and feedback. In August of 1992, a second draft of the analysis tool was completed and pilot tested by the design team.

The analysis tool was distributed to each of the ten RELs, whose representatives applied it to state level science and mathematics framework documents in their respective regions. Information from these analyses was collected and compiled by McREL to provide a summary document of the current status of mathematics and science frameworks in the United States (as of Fall, 1992). This report is to be released by June, 1993.

Philosophy

Curriculum frameworks reflect the policy and educational environment of a state. However, a curriculum framework by itself is not enough to ensure change. The Laboratory Network Program Curriculum Frameworks Task Force believes that the processes of curriculum framework development, implementation, and evaluation are as essential as framework content to reform in mathematics and science education. A well designed curriculum framework is a dynamic tool providing guidance for local innovation. Curriculum frameworks also represent opportunities for dialogue and professional development that encourage local decision making.

A systemic perspective on change requires curriculum frameworks to be more than curriculum guides. They must address such complex issues as teaching and learning strategies, technology, assessment, and materials. The Task Force believes that while there is not presently a single state framework document that is in itself exemplary, many state framework documents have exemplary components that might provide a model of effective practices for other states. Given this perspective, the Task Force believes the analysis of mathematics and science curriculum frameworks will enhance the understanding of framework processes and content, offer a forum for inter-state sharing of practices, and enable educators to develop strategies for reform at the state and local level.

Definition of Framework

The following is a working definition established by the Laboratory Network Program Curriculum Frameworks Task Force which we anticipate will change as our project evolves:

> A curricular framework is a bridge between established standards and classroom practice. It articulates, organizes, and integrates the content and processes of education in a particular discipline. It facilitates multiple levels of policy and curriculum decision making, especially in school districts and schools.

Components of the Analysis Tool

Figure 1 on the following page is a schematic depicting the seven elements of the science/mathematics curriculum framework Analysis Tool: Purpose, History, Structure, Philosophy, Mathematics and Science in Society, Framework Components, and Implementation. Each of these elements can be further subdivided into integral topics or issues. For instance, the Purpose category addresses such aspects as the Target Audience, Role of Target Audience Groups, and Intended Use of the Framework Document.

Implementation of the Analysis Tool

Each of the ten Regional Educational Laboratories and/or Regional Consortia for Mathematics and Science have consultants on their staff who have been trained in how to effectively use the Analysis Tool in providing technical assistance to states.

This Analysis Tool has been developed, refined, and used to analyze over 40 state curriculum frameworks in mathematics and science. Its design is intended to allow anyone using this instrument to answer questions associated with each of the component parts of a framework. In reviewing a document to determine if it addresses specific components, the reviewer becomes better informed as to the organization and information contained in the document. Hopefully, more than one person analyzes each document. A dialogue between reviewers would be the next step in the process. It is hoped that through an informed discussion, decisions can be made as to what should and should not be contained in the framework. Once these decisions have been made, the Analysis Tool assists in the development/refinement of a framework by requiring individuals involved in the process to examine the depth of material and information which the framework will address.

The Analysis Tool may be followed in the order presented, or in another order, or pieces of it may be pulled out and applied for development and/or revision of specific elements of a framework. It may be used by an individual, although we encourage group application so that individual and group ownership is maintained.

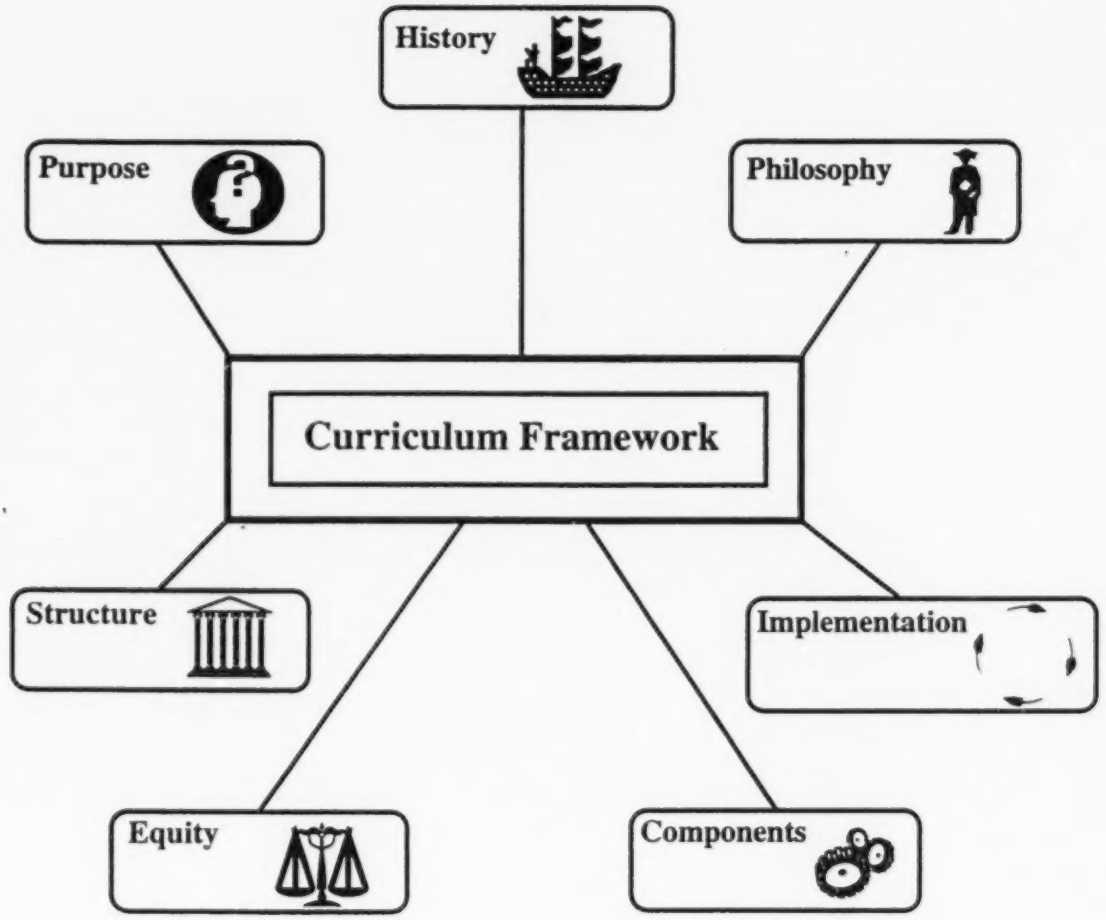

Figure 1: Components of the Analysis Tool

II.
Analysis Tool

Curriculum Framework Analysis Tool

A Laboratory Network Program Product

Framework Analyzed (Check one): **Math** ___ **Science** ___

Integrated ___

Name/Date of Document(s) Analyzed: _____

_____

_____

State: _____

Name of Analyst and Affiliation: _____

Date of Analysis (Month/Day/Year): _____

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In completing the following analysis tool, there are instances when questions have a ranking schedule attached in the form of (N, L, M, H). These stand for: N – None, L – Low, M - Medium, and H – High and are typically in reference to a level of specificity regarding some component of the framework.

1. Purpose

Target Audience

1.1 *Who is the target audience for the framework (e.g., teachers, intermediates, curriculum supervisors [LEA, SEA])?*

1.2 *How is the framework intended to be used by the target audience (e.g., to guide local curriculum development, to aid accountability, to specify student outcomes, etc.)?*

Goals/Utility

1.3 *What are the goals to be met through the framework (e.g., bridge between standards and curriculum, curriculum guide, guide to outcomes, etc.)?*

1.4 *Does the framework address the roles of appropriate groups for implementation?*

2. History

2.1 *In what ways does the framework state the history of its development based on:*

- *Impact of law, legislation;*

- *SDE, Grass Roots, Academic Community, National Organizations, etc.?*

2.2 *What is the period and process of revision?*

2.3 *In what ways does the framework incorporate systemic perspectives of change?*

2.4 *In what ways are current reform initiatives (e.g., 2061, NCTM standards) reflected in the framework (please specify)?*

3. Structure

3.1 *What is the unit of analysis in terms of the delivery of content (e.g., single-grade, multi-grade, courses, etc.)?*

3.2 *How is subject matter organized in the framework (e.g., themes, sequential, conceptual, strands, topics, etc.)?*

3.3 *What are the components covered in the scope of the framework (e.g., content addressed, strategies, assessment, materials, etc.)?*

3.4 *Is the content of the framework given in multiple forms of representation (e.g., webs, diagrams, charts, narrative, etc.)?*

3.5 *Are references cited and listed?*

4. Philosophy

4.1 *Is there a Philosophy?*

4.2 *Is there a vision of teaching stated? What is it?*

4.3 *Is there a vision of learning stated? What is it?*

4.4 *Is there a discussion of the nature of science/mathematics? What is it?*

4.5 *How is the Philosophy reflected in the framework components (N, L, M, H)?*

5. Mathematics and Science in Society

5.1 *In what ways does the framework address the following issues:*

- *Equity*

- *Multi-cultural*

- *Ethical*

6. Framework Components Content Addressed

6.1 *Give some examples of how the framework addresses:*

- *Skills/processes*
- *Competencies*
- *Attitudes*
- *Outcomes of performance*
- *Integration across content areas (e.g., Physics/Chemistry, Algebra/Geometry, etc.)*
- *Integration across discipline areas (e.g., Mathematics/Science, Science/Social Studies, Mathematics/Language Arts, etc.)*

6.2 *What is the degree of specificity in content addressed (N, L, M, H)?*

6.3 *Given the organization of subject matter identified in question 3.2 of the Structure section, what content is contained (e.g., measurement, numeracy, geometry, systems, models, change, diversity, etc.)?*

6.4 *In what ways are cultural issues addressed in the subject content?*

6.5 *In what ways are equity issues addressed in the subject content?*

Strategies

6.6 *Does the framework suggest teaching strategies for the content addressed (e.g., modeling, small group, use of manipulatives, etc.)?*

6.7 *What are they?*

6.8 *Are examples given which reflect stated strategies?*

6.9 *Does the framework suggest strategies for student learning of the content addressed?*

6.10 *What are they?*

6.11 *Are examples given for the recommended strategies (e.g., prior knowledge, concept attainment, etc.)?*

6.12 *What is the degree of specificity for the strategies addressed (N, L, M, H)?*

6.13 *How are cultural issues addressed in the strategies and examples?*

6.14 *How are equity issues addressed in the strategies and examples?*

Technology

6.15 *Does the framework include the uses of educational technology as a tool for learning (e.g., calculators, computers, multi-media, etc.)?*

6.16 *Does the framework include technology as a skill/competency area (e.g., computer programming, video production, etc.)?*

6.17 *Does the framework include the impact of technology on mathematical and scientific developments (e.g., data analysis of satellite transmission, automatic teller machines, etc.)?*

Assessment

6.18 *Does the framework address issues of assessment (e.g., student, teacher, program, etc.)?*

6.19 *How?*

6.20 *Is there alignment between assessment and the content the framework addresses?*

6.21 *Is there alignment between assessment and teaching/learning strategies?*

6.22 *What is the degree of specificity of assessment addressed (N, L, M, H)?*

6.23 *In what ways does the assessment take into account cultural issues?*

6.24 *In what ways does the assessment take into account equity issues?*

Materials

6.25 *Are appropriate student/teacher materials suggested for whatever content the frameworks discussed?*

6.26 *What are they (e.g., lab equipment, literature, manipulatives, etc.)?*

6.27 *Are teaching strategies and the use of materials appropriately aligned?*

6.28 *What is the degree of specificity for materials addressed (N, L, M, H)?*

6.29 *In what ways are cultural issues addressed in the suggested materials?*

6.30 *In what ways are equity issues addressed in the suggested materials?*

7. Implementation

7.1	*In what ways does the framework provide suggestions for:*	*Degree of Specificity*
	• *Long Range Planning*	*N, L, M, H*
	• *Staff Development*	*N, L, M, H*
	• *School-Community Relations*	*N, L, M, H*
	• *Developing/Fostering Support*	*N, L, M, H*
	• *Learning Environment/Facilities*	*N, L, M, H*
	• *Resources*	*N, L, M, H*
	• *Curriculum Development*	*N, L, M, H*

7.2 *If these issues are not addressed, are there references to other documents that address them?*

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